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INFO-0399

AECB STAFF ANNUAL REPORT OF POINT LEPREAU G.S. FOR THE YEAR 1990

May 1991

Canada

Report

92-06469/

AECB STAFF ANNUAL REPORT FOR THE YEAR 1990

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1. INTRODUCTION

This report is a review by AECB staff of the operation of Point Lepreau Nuclear Generating Station during 1990. The review is based on information contained in the various documents submitted by New Brunswick Power under the terms of the Operating Licence and on information gathered by AECB staff during routine site monitoring, inspections and audits.

2. STATION OPERATION

The station again operated at high power for the majority of the year, generating a total of 5.71 TWh(gross), corresponding to a gross capacity factor of 95.9%.

The plant was shut down in April for an eight day planned maintenance outage. During the outage a reactor building leak rate test was performed, as required by the Operating Licence. The leak rate was determined to be 0.38% of the contained volume per day which compares favourably with the operational target of 0.5%.

3. AECB STAFF REVIEW OF OPERATIONAL SAFETY ASPECTS

3.1 Station Compliance

There were six observed non-compliances with the conditions of the reactor Operating Licence during the year. Five of these non-compliances concerned failures to operate in accordance with the facility's Operating Policies and Principles, which is a licence requirement. Further information on these non-compliances can be found in section 3.7 and Attachment B to this report. AECB staff considers these non-compliances to be relatively minor, and to have had no actual impact on plant safety. However, they clearly indicate a need for NB Power to address regulatory compliance. This aspect is addressed more fully in section 4.5.

3.2 Quarterly Reports

Reports of station operation were submitted by NB Power, as required by the reactor Operating Licence (PROL 12/90, Condition A.A.22). AECB staff has reviewed these reports in detail and concludes that the licensee has reported comprehensively and accurately.

3.3 Radiation Protection

During the year, there were no exposures greater than regulatory limits which were directly attributable to station operation. An incident, in which eight individuals received tritium exposures due to the deliberate contamination of a drink cooler, occurred in February, and is discussed later in this section.

The total station dose expenditure attributable to station operation was 567 person-mSv whole-body dose (referred to as "deep dose" by New Brunswick Power) and 590 person-mSv skin doses (refered to as "shallow dose" by New Brunswick Power). Of the deep dose approximately 38% was attributable to tritium exposure. In addition 466 person-mSv was received as a result of the contaminated drink cooler incident. These figures compare with deep dose exposure of 1252 person-mSv and 1370 person-mSv shallow dose in 1989, and reflect a lower level of dose intensive work completed in 1990.

The dose distribution is shown in the following table. Corresponding figures for 1989 are included for comparison.

	1990	1989
0 to 0.2mSv	720	666
0.2 to 5mSv	295	305
5 to 10mSv	16	70
10 to 15mSv	5	14
15 to 20mSv	1	5
20 to 35mSv	0	0
35 to 40mSv	1	0
40 to 45mSv	1	0
Over 50mSv	4	0

The seven individuals who received exposures greater than 15mSv received these doses primarily as a result of the contaminated drink cooler incident. There were no exposures over 15mSv directly attributable to station operation.

3.3.1 Contaminated Drink Cooler Incident

In February, eight people received tritium exposures as a result of drinking contaminated fruit juice from a dispenser in the Zone 2 coffee shop. The contamination resulted from the deliberate addition of tritiated moderator water to the dispenser by a plant employee. The employee was later apprehended, and convicted of administering a noxious substance with intent to aggrieve or annoy. Seven of the individuals were found to have exceeded regulatory dose limits. Six have sought, and have been given, AECB approval for their return to radiation work.

3.4 Station Effluents and Environmental Monitoring

3.4.1 Station Effluents

Activity in gaseous effluents averaged 1.6 $x10^{-2}$% of the derived emission limit (DEL) in 1990. The major contributing factor was tritium. This corresponds to a dose of 0.8μSv to the critical group located 1 km from the station.

The above figures do not include a contributing component for carbon-14. AECB staff has not finalized its position on the DEL for this isotope. However, Carbon-14 emissions in 1990 are similar to those reported for 1989. Based on the methods used for calculating dose to the critical group in 1989, the

contributing dose to the critical group in 1990 for carbon-14 would be 0.15μSv, and the total dose due to gaseous effluents 0.95μSv

Activity in liquid effluents averaged 3.3×10^{-3}% DEL for 1990. This corresponds to a dose of 0.2μSv to the critical group and is an increase over the 1989 value (0.08μSv). The increase was due to chemistry control problems in the shield cooling water system. Further information on these problems is included in section 3.10.

3.4.2 Environmental Monitoring

The environmental monitoring program was conducted satisfactorily during 1990. There was no dose recorded at the environmental TLD sites which could be attributed to station operation. The only radionuclide found by the environmental monitoring program which can be related to the operation of Point Lepreau is trace quantities of tritium in air.

3.4.3 Health Physics Appraisal

In May 1990, AECB staff conducted an appraisal of the Point Lepreau gaseous effluent monitoring system. The appraisal team concluded that the system is managed and operated in a competent and professional manner. The team identified some areas where improvement could be effected, and made four recommendations. NB Power has made substantial progress in addressing three of these recommendations. Actions required to address the fourth recommendation, calling for independent validation of the gaseous effluent monitoring system, is the subject of on-going discussions.

3.5 Process Systems

There were no serious process system failures in 1990. (A serious process system failure is defined as a failure which requires the operation of one or more of the special safety systems to prevent fuel failures and/or the release of fission products).

Highlights relating to process system operation during the year are:

- During examination of manufacturing offcuts from pressure tube G12, an apparent defect was found. The pressure tube was inspected during the 1990 annual outage, and the defect was found to be confined to the outer, low stress, area of the tube rolled joint. The tube remains in service, and will be subject to further inspection in 1991. For further information, see UER90-01 in Attachment B to this report.

- In February, the plant was shutdown following the discovery of a crack in the downcomer from the deaerator to the suction of the boiler feed pumps. For further information see UER90-03 in Attachment B.

- In June, an apparent discrepancy between indicated neutron power and thermal power occurred. The plant was restricted in output until the difference could be resolved. Investigations indicated that power measurement was within allowable tolerances, and the discrepancy had

primarily been caused by a slow change in neutron flux distribution, in turn due to a revised fuelling strategy. This conclusion was confirmed by verifying the accuracy of equipment used in the measurement of thermal power.

- In October, a leak occurred in the steam drains system, which was caused by erosion damage. The plant was placed in poison prevent mode while a repair was effected. Replacement of these lines with more resistant materials is expected to take place during the 1991 annual outage.

- In November, a power manoeuvre to zero power was carried out to allow crimping of a leaking delayed neutron monitoring system tube, which was causing elevated levels of tritium in the reactor building. Leakage on these small bore tubes occurs due to vibration induced fretting, and has been a recurring problem.

3.6 Performance of Special Safety Systems

No unavailability was reported for each of the four special safety systems during 1990. Analysis for an event which brought into question the sensitivity of the containment isolation radiation detectors is not yet complete, but it is unlikely that the conclusions of this analysis will indicate that an impairment occurred.

Lifetime availability performance figures are poor, and are dominated by unavailabilities experienced in previous years. NB Power is improving its approach to reliability assessment, but considerable work remains to be done before component reliability trends can be detected and rectified before impacting system availability.

NB Power have instituted other programs which should have a favourable impact on the performance of special safety systems. These are discussed in section 4.5, below.

3.7 Significant Events

Twenty eight events were reported under the conditions of the Point Lepreau Operating Licence during 1990, and prompt notification of these events was completed satisfactorily. In the AECB staff review of operation during 1989, it was observed that final submission of formal event reports had frequently been excessively delayed. Following the review's publication in June 1990, submission of formal reports for 1990 improved very significantly, from an average of 11 weeks before June, to an average of about 19 working days thereafter. This level of performance meets AECB staff's expectation that such reports should be submitted within 20 working days.

The number of events reported in 1990 is considerably greater than that reported in 1989 (12 events), and is the highest number recorded since plant start up in 1982. At least part of the increase stems from an increased awareness among station staff of the safety and regulatory significance of operating events, which represents a positive change which AECB staff encourages. Based on one year's data, it is not possible to judge if there is any fundamental underlying

trend towards a real increase in the number of events, and it will therefore be necessary to carefully monitor both future events and their root causes. Event analysis, and in particular a recognition of the human factors contribution, is an on-going topic of discussion with NB Power.

AECB staff review of operating experience feedback from unplanned events indicates that the current situation is not satisfactory. A significant number of follow up actions, of varying priorities, which have been assigned in response to events reported to the AECB, have not been completed in a timely fashion. NB Power has indicated that changes to the way these actions are planned are in progress, and AECB staff intends to monitor performance in this area closely during 1991.

A description of each of the events reported in 1990 is included as Attachment B to this report.

3.8 Quality Assurance

In June 1990, in conjunction with the New Brunswick Department of Labour staff, AECB staff conducted an audit of a portion of the licensee's QA Program, concentrating on unplanned events and testing. The auditors found certain elements of the unplanned event reporting procedures to be unsatisfactory, and issued one directive and two action notices pertaining to unplanned event reports. There were no significant deficiencies found in the elements of testing examined. Three recommendations were made by the auditors, one concerning unplanned events, and the others associated with testing.

3.9 Station Maintenance

The station maintenance program was conducted satisfactorily during the year. Station staff completed approximately 7471 scheduled maintenance items, corresponding to about 91% of the maintenance items originally scheduled for the year. Unscheduled work totalled about 8582 items. AECB staff considers that execution of the plant maintenance program has been controlled to acceptable standards during 1990.

3.10 Chemistry Control

The majority of plant systems experienced no difficulties with chemical control during 1990. The exception was the shield cooling system, where abnormal levels of hydrogen, probably of radiolytic origin, were found in the cover gas over an extended period of time. Attempts to cure the problem by purging the shield cooling water were not successful, but resulted in a significant contribution to liquid effluent releases, as discussed in section 3.4.1.

3.11 Station Management

There were no changes in AECB authorised management positions in 1990.

3.12 Training

N.B. Power personnel achieved a success rate of 58% (7 out of 12) in candidate examinations towards obtaining AECB authorizations as shift supervisors or control room operators. At the end of the year construction of the building to house the new control room simulator was proceeding on schedule as was the manufacture and commissioning of the simulator. The simulator is expected to be available for use by the training department in mid 1991.

3.13 Emergency Exercises and Drills

All five shift crews participated either in an emergency exercise, in a drill, or in a station alert incident. The drills performed exercised the crews' response to fire and medical contingencies. There were two station alerts during 1990, which required activation of the medical and the chemical response plans. In general, it was concluded that the ability of station staff to respond to emergencies was satisfactory.

3.14 Security

Three security related incidents occurred in 1990, which are described in Attachment B to this report. In October, 1990, AECB staff conducted its annual inspection of station security arrangements. Security at the station was found to be generally satisfactory.

3.15 AECB Staff Inspections

Throughout the year, AECB staff monitored station operation, and conducted inspections of station operation, maintenance and administration. In addition, AECB staff conducted detailed field inspections of the state of equipment in various reactor systems. Minor problems were communicated directly to operating staffs: there were no significant safety-related deficiencies identified by these inspections. Additional information on the AECB staff compliance inspection program is given in Attachment C to this report.

3.16 Measures of Station Performance

Indicators of the quality of overall station operation have been tabulated in Attachment A with the corresponding 1989 information included for comparison.

3.17 Safeguards

Measures for the application of safeguards at Point Lepreau, in accordance with the International Treaty on the Non-Proliferation of Nuclear Weapons, were generally maintained satisfactorily during 1990. One incident had the potential to cause an interruption of safeguards monitoring of the spent fuel bay, as described in event report UER90-20, summarised in Attachment B. However, camera surveillance of the fuel bay was effectively maintained during the event.

During the year, a number of discussions were held with NB Power concerning safeguards measures to be applied during movement of spent fuel in the fuel bay, en route from the bay to the Solid Radioactive Waste Management Facility

(SRWMF), and in storage at the SRWMF. These discussions stem from the development, by NB Power, of dry fuel storage, which is expected to commmence in the summer of 1991.

4. SIGNIFICANT LICENSING MATTERS AND ACTIVITIES

During 1990, AECB staff opened fifteen action items to be addressed by NB Power and four action items were completed and closed. At the end of the year, thirty nine action items remained incomplete. The continued deterioration in response to AECB action items confirms a trend observed in the 1989 Annual Report on Operations at Point Lepreau, and AECB staff consider that a major contributor is a developing resource problem, which is likely to be aggravated further by NB Power's current budget and hiring policies.

The following sections identify important licensing issues which directly affect safe operation of the station:

4.1 Licence Renewal

The current Operating Licence, PROL12/90, expires on June 30 1992.

4.2 Containment Leak Rate Testing

As indicated in Section 2, a design pressure leak rate test of the reactor building was completed in 1990, with satisfactory results. The majority of the improvement from past test results is attributable to the program of application of new liner material, and NB Power has indicated that this program will be continued until the majority of the reactor building walls have been treated. A schedule for future routine testing of containment is under discussion between NB Power and AECB staff.

NB Power has also completed development of a containment integrity test, which is carried out at low pressure, and which can therefore be completed while the reactor is at power. This test is sensitive enough to detect leakage of a magnitude which would represent an impairment of the containment envelope, but it does not provide information on the ability of the containment structure to withstand full design pressure. The test is currently being scheduled yearly following major outages, with the intention of ensuring that no containment leakage has unintentionally been caused by maintenance activities. The frequency of these tests is under discussion with NB Power.

4.3 Follow-Up To Chernobyl Accident

During 1990, NB Power continued the analysis of the effectiveness of the shutdown systems under accident conditions with abnormal flux shapes. The study for shutdown system one is now essentially complete, but requires additional work to ensure that operation of the plant is always in conformance with the safe envelope defined by the analysis.

4.4 Steam and Feedwater Line Failures in the Turbine Building

NB Power has made a number of changes in the last three years, which are intended to reduce the probability of a secondary system failure, and to improve the capability of the plant to withstand such a failure. These improvements include changes to secondary side chemistry, the implementation of an inspection program for secondary side pressure retaining components, the replacement of pipework where erosion/corrosion damage has been observed with more resistant materials, and the structural strengthening of the turbine building. However, AECB staff has indicated to NB Power that a clear demonstration of defence in depth is required for all failures of a significant probability level. A resolution to this issue is overdue.

4.5 Safety in Operations and Maintenance

During 1990, AECB staff has continued discussions with NB Power on means to ensure that a strong awareness of safety and regulatory requirements is a fundamental part of station operations and maintenance. These discussions stem from the causes underlying some past instances of safety system impairment, and recurring problems with the maintenance of safety system equipment. NB Power is initiating a program of 'Excellence in Maintenance', and AECB staff expects that this awareness will be factored into the program. NB Power has also initiated a program which is intended to define in a more rigorous manner the permissible operating envelope of all components which, implicitly or explicitly, have been assumed to be involved in postulated accidents in the plant's Safety Analysis. This approach is expected to reduce or eliminate the potential for operating or maintenance actions to impair safety functions.

5. CONCLUSIONS

5.1 AECB staff considers that Point Lepreau Generating Station has been generally operated and managed safely during 1990.

5.2 Availability performance of the four special safety systems was acceptable this year, although the lifetime performance figures remain poor due to unavailability experienced in previous years. Measures which NB Power is introducing to improve safety system reliability performance are very encouraging, but will need to be vigorously pursued over a number of years to achieve the required long term improvement.

5.3 Clear indications that the operation of Point Lepreau is being affected by resource limitations are evident, and current budget and hiring restrictions are likely to worsen the situation. These problems have the potential to affect both the safety and licensability of the plant if they are not rectified by NB Power.

5.4 Action is necessary to ensure that operating experience feedback from unplanned events is promptly and effectively incorporated into the station's operations.

5.5 Action will be taken by AECB staff in 1991 to resolve the outstanding questions related to steam and feedwater line failures in the turbine building.

5.6 Measures undertaken by NB Power to ensure all station staff are aware of the safety and regulatory requirements affecting their tasks, are important, and should be continued on an urgent basis.

ATTACHMENT A - SUMMARY OF STATION PERFORMANCE INDICATORS

POINT LEPREAU G.S. - 1990

		1990	1989	AECB STAFF COMMENTS[1]
A.	Radiation Control			
	Total deep dose	1033[2] person-mSv	1252 person-mSv	A[4]
	Total shallow dose	1056[2] person-mSv	1370 person-mSv	A[4]
	Total extremity dose	120 person-mSv	783 person-mSv	A
	Total neutron dose	95 person-mSv	126 person-mSv	A
	Number of exposures > regulatory limits	7[2]	0	A[4]
	Number of exposures > 20 mSv	6[2]	0	A[4]
	Number of radiation related investigations	1	3	A[4]
	Releases from the station			
	a) Airborne[3]			
	Tritium: No of months >1% DEL	0	0	A
	Average % DEL for year	1.6E-2	1.3E-2	A

[1]A - Acceptable NI - Needs Improvement NA - Not Available UR - Under Review

[2]Seven individuals received exposures greater than regulatory limits as a result of the contaminated drink incident, six of these exposures being greater than 30 mSv. The station dose totals include 466 person-mSv received as a result of the incident.

[3]Does not include data for Carbon-14, as discussed in section 3.4.1

[4]The classification of "Acceptable" is assigned to doses due to station operation. Clearly, the deliberate contamination of the drink cooler was unacceptable.

		1990	1989	AECB STAFF COMMENTS
Releases from the station (cont'd)				
Noble gas:	No of months >1% DEL	0	0	A
	Average % DEL for year	0	0	A
Iodine 131:	No of months >1% DEL	0	0	A
	Average % DEL for year	0	1.9E-4	A
Particulates:	No of months >1% DEL	0	0	A
	Average % DEL for year	0	0	A
b) Waterborne				
Tritium:	No of months >1% DEL	0	0	A
	Average % DEL for year	3.3E-4	6.8E-4	A
Gross Beta-Gamma	No of months >1% DEL	0	0	A
	Average % DEL for year	3.0E-3	8.3E-4	A

	1990	1989	AECB STAFF COMMENTS
Public Dose			
Average boundary dose rate[1] to critical group from emissions	1.15μSv/y	0.88μSv/y	A
Estimated collective population dose	<5 person-mSv	NA	A
Environmental Measurements[2]			
Mean boundary tritium in air	<1 Bq/m^3	<1 Bq/m^3	A
Mean tritium in precipitation	<83 Bq/l	<93 Bq/l	A
Mean tritium in well water	19 Bq/l	24 Bq/l	A
Tritium in milk	Not detectable	Not detectable	A
Environmental sampling			A
Laboratory intercomparison program			A
B. Plant Control			
Number of completed reactor trips	1	0	--
Number of serious process failures	0	0	A

[1]These are calculated values, based on average plant emissions. The actual background gamma dose rate in the area varies between aproximately 570 and 820μSv/yr.

[2]Presence of isotopes other than tritium, caused by station operation, is not detectable

	1990	1989	LIFETIME	AECB STAFF COMMENTS
Special safety system unavailability (years/year) (Target: 1.0E-3 years/year)				
SDS1	0	0.22	0.34	A
SDS2	0	0.23E-3	0.10	A
CONTAINMENT	0[1]	0.12	15.0E-3	A
ECCS	0	0.09E-3	5.8E-3	NI
Special Safety System predicted future unavailability[2]				
SDS1	0.75E-3	NA		UR
SDS2	0.74E-3	NA		UR
CONTAINMENT	0.22E-3	NA		UR
ECCS	1.71E-3	NA		UR
Number of safety related/ support systems not meeting availability target	0	1		A
Number of reportable incidents	28	12		UR
Number of non compliances with OP&P's and licence conditions	6	0		NI
Number of fires	0	0		A
Number of significant personnel errors in reportable incidents	13	4		UR
AECB compliance inspections "unsatisfactory"	0	0		A
Number of forced outages	5	0		A

[1]This figure is not yet finalised - see UER90-17 in Attachment B

[2]Methodology for these predictions is under discussion with NB Power

C. Plant Administration

Average number of temporary operating instructions in force	14	11	A
Number of systems with more than one temporary operating instruction in force	0	0	A
Average number of temporary instructions behind schedule for review	0	0	A
Total number of outstanding call ups (as of 17 May 1991)	729	444	U.R.
- on special safety systems only	79	32	U.R.
- on standby safety support systems	39	20	U.R.
Total number of outstanding work orders (as of 17 May 1991)	2825	1180	U.R.
- on special safety systems only	140	56	U.R.
- on standby safety support systems	96	99	U.R.
Total number of jumpers in effect (as of 17 May 1991)	445	NA	U.R.
- on special safety systems only[1]	19	NA	U.R.
- on standby safety support systems	17	NA	U.R.

D. Licensing

Number of AECB Action Items open at year end	39	28	NI

[1]Any jumpers installed on Special Safety Systems are subject to AECB staff review and approval before being implemented.

AECB STAFF COMMENTS

E. Operation

Control room operating standard	A
Field operator standard	A
Chemical control	A
Radiation control	A
Health Physics	A
Housekeeping	A
Quality assurance program	A

ATTACHMENT B - SUMMARY OF REPORTABLE EVENTS

POINT LEPREAU G.S. - 1990

A EVENTS REPRESENTING A NON-COMPLIANCE WITH THE OPERATING LICENCE

UER90-05: Failure to Test Following Modification to Moderator Temperature Trip

The station's Operating Policies and Principles require that for work on channelised systems - in this case SDS1, work must be completed on one channel, and the channel tested, before proceeding to work on another channel. In this case, work on a second channel was undertaken without testing the first channel worked on. Fortunately no impairment of the shutdown system occurred as a result of this event, but it is reportable to the AECB as a failure to follow the procedures defined in Operating Policies and Principles.

UER90-09: Approach to Critical - Reactivity Devices on Manual

Due to operator error, an approach to critical was started with the liquid zone control system in special shutdown mode, and the adjusters on manual. This represented a violation of operating procedures and the station's Operating Policies and Principles. The deficiency was found and rectified before criticality was achieved.

UER90-13: Fuelling Without Delta-P Indication

During fuelling of one channel, the channel differential pressure indication was not available, because the transmitter was valved out. Fuelling on the channel was completed using channel temperature readings to confirm adequate flow. AECB staff requested this report under the provisions of Operating Licence Condition A.A.12, since it represented operation in conflict with the intent of a section of the station's Operating Policies and Principles, which requires indication of adequate channel flow to be available during fuelling.

UER90-016: Loss of Dousing Tank Level Indication in the Secondary Control Area

The station's Operating Policies and Principles require that maintenance and surveillance procedures ensure that monitoring and control functions which are provided in the secondary control area for emergency use, are available at all times. In this case, it was noticed that an indication of dousing tank level was reading incorrectly, and it was found that there were no surveillance requirements which would ensure that the instrument was in fact functional.

UER90-20: Obstruction of IAEA Camera in Spent Fuel Bay

During work on the spent fuel bay crane, staging was erected, which restricted the view of an International Atomic Energy Agency camera. These cameras are required to ensure continuous safeguards surveillance of the spent fuel bay.

UER90-25: Ventilation Zone Flow Violation

The station's Operating Policies and Principles require that ventilation flows be maintained from zones with a low probability of contamination towards zones with a higher probability of contamination. During a work plan review, it was found that it had been a routine practice to operate zone 3 supply fans while the central contaminated exhaust system was out of service for maintenance, thus causing a potential for a reversal of the required ventilation flow.

B OTHER EVENTS

UER90-01: Indication of Manufacturing Defect in Pressure Tube

This report concerned the discovery of an apparent defect in off-cuts which had been trimmed from pressure tube G12 prior to the original installation of this tube in the reactor. The off-cuts were being examined to determine if any of the Point Lepreau pressure tubes were subject to a particular type of manufacturing flaw, which had previously contributed to the failure of a pressure tube at Bruce NGS 'A'. Pressure tube G12 was inspected during the 1990 outage, and the defect was found in the location expected from the flaw in the off cut. The extent and position of the defect were found not to be a hazard to the integrity of the tube, and the pressure tube remains in service. It will be subject to further inspection during the 1991 annual outage to confirm that the defect is stable.

UER90-02: Boiler Make-up Water Logic Problems

During investigation of a logic problem in the boiler make-up water systems, operations staff applied a jumper to one of the valves to prevent it from opening, in order to minimise the risk of water hammer in the system. However, this action rendered the system unavailable for automatic operation for a total of 35 minutes. AECB staff has questioned the level of authorisation required for such actions, and the absence of specific operating instructions prohibiting them. Revisions to operating procedures are in preparation by NB Power as part of the follow up to this event, and discussion of the management and approval of jumpers is under discussion under an AECB Action Item.

UER90-03: Crack in Boiler Feed Pump Suction Line

In February, a small leak was found in the suction downcomer from the deaerator to the boiler feed pumps. The plant was quickly shut down, and the leak was found to originate from a large crack in the line. The crack originated as a result of fatigue due to loading from a pipe restraint. The crack was repaired, and the restraint modified to prevent a further occurrence.

UER90-04: Failure to Transfer from Normal to Solid Mode

During plant run down to repair the boiler feed pump suction line failure described in UER90-03, a pressure transient in the heat transport system occurred when a control handswitch was moved from the 'Normal' mode (in which the computer control program uses algorithms appropriate to normal operation with the pressuriser on line) to the 'Solid' mode (where the pressuriser is isolated from the rest of the heat transport system). The problem was traced to a fault in the handswitch. NB Power have issued operating instructions to minimise the possibility of a pressure disturbance if logic problems develop during control transfer.

UER90-06: Deliberate Addition of Heavy Water to A Drink Cooler

This event, in which eight plant workers received tritium uptakes as the result of deliberate contamination of a drink cooler with moderator heavy water, is discussed more fully in section 3.3.1 of the main report.

UER90-07: SDS2 Boiler Feed Line Low Pressure Trip

Due to breakdown in communications between the control room and the field, where a maintainer was preparing to carry out a routine calibration of a boiler feed flow transmitter, the transmitter was isolated before its inputs to the control computer had been disabled. The ensuing plant transient led to a completed trip on the SDS2 boiler feedline low pressure parameter, as feed line pressure increased beyond the rational measurement range. During investigation of a single channel boiler low level trip on SDS1 during the transient, it was found that the associated boiler low level trip transmitter had an incorrect damping setting. Similar problems were subsequently found with other safety system transmitters, as discussed in UER90-08 and UER90-12.

UER90-08: Rosemount Transmitter Electronics

During investigation of the response of the boiler level instrumentation following the reactor trip described in UER90-07, it was discovered that the linearity adjustment of one transmitter had been incorrectly set, instead of the transmitter damping. Further investigation revealed that this had occurred because the transmitter had been fitted with an incorrect version of the electronic circuit board, which did not have a damping adjustment. Other special safety system transmitters were checked, and a total of ten were found with incorrect damping adjustments, and fourteen with the incorrect electronics board. As a result of this event, and a subsequent event (UER90-12), NB Power has instituted a committee to study organisational and procedural changes which would ensure prevention of this type of incident.

UER90-10: Standby Generator #1 Starting Air Failures

On three occasions, the standby generator failed to start on test due to apparent starting air problems. The fault was subsequently traced to incorrect pilot air timing, which occcurred as the result of inappropriate information in the machine's maintenance manual.

UER90-11: Escape of Tritiated D2O during Shipment

One of a shipment of 88 drums of heavy water from Point Lepreau to LaPrade Heavy Water Plant was found to be leaking during unloading, resulting in the interior of the transport trailer being contaminated with tritium.

UER90-12: SDS1 Low Flow Transmitter Damping

On two separate occasions, presssure transmitters were found with their linearity and damping controls incorrectly set, affecting calibration and response time of the transmitters. This was caused by confusion between the two controls during adjustment, which in turn was aggravated by the number of different electronics boards fitted to Rosemount transmitters (see UER90-08).

UER90-14: SDS1 Boiler Level Calibration Errors

This report was requested by AECB staff, under the provisions of Operating Licence Condition A.A.12. The calibration errors in question were minor in nature, but arose from the use of an outdated calibration sheet. This raised the possibility of other common cause problems on safety system instrumentation, which might be associated with poor communications between different station work groups, or poor maintenance practices. This concern was also related to the difficulties associated with pressure transmitters (UER90-08 and UER90-12), and an incident in 1989 where inappropriate calibrations were applied to pressuriser low level trip transmitters.

UER90-15: Transfer of Liquid Scintillant Vials to Solid Rad Waste Facility

This event concerned the inappropriate transfer of liquid waste to the solid waste management facility, caused by inadequate procedures for the collection, storage and disposal of liquid scintillant.

UER90-017: Containment Isolation Activity Monitor Setpoints

An inconsistency was discovered between the actual sensitivity of the containment isolation activity monitors in their installed positions, and the sensitivity assumed in design and safety analysis. The inconsistency has been temporarily resolved by changing the monitor setpoints until a more detailed analysis can be completed. At the time of preparation of this report, it is unclear whether this problem would have affected the performance of the containment isolation system, to the extent that availability would have been affected. However, from information presented to date, it appears likely that adequate detector sensitivity was in fact retained.

UER90-18: Degradation of Reactor Building Ventilation System Charcoal Efficiency

In-situ tests of the reactor building charcoal filters indicated that the efficiency of the filters in removing iodine isotopes from the ventilation flow was not as high as expected. The major impact of this loss of efficiency is on the ability to control releases following certain types of accident. The lowered efficiency could also have affected routine releases to the environment, however actual measured releases have remained well below both operating targets and regulatory requirements. Effectiveness of charcoal filters is being discussed by AECB staff with all Canadian CANDU operators under an Action Item.

UER90-19: Intrusion Detection System Problems

This report deals with temporary problems experienced in maintaining the security intrusion detection system.

UER90-21: Hostile Action Threat Against the Facility

A threat was received by the Canadian Broadcasting Company in Moncton, which indicated that a number of targets, including Point Lepreau, would be attacked if the crisis then in progress at Oka, Quebec, was not resolved. RCMP arrested a suspect later the same day, who was subsequently charged with uttering a threat and sentenced to a fifteen day jail term.

UER90-22: Delay in Maintenance on Moderator Temperature Trip

Following the discovery during routine test that one channel of the moderator trip actuated outside the normal acceptable range, actions necessary to recalibrate the loop and return operation to normal were not completed for eight days. Although this fault affected indication only, and did not impair the actual trip function, AECB staff requested a formal report of this event under Reactor Operating Licence Condition A.A.12.

UER90-23: Bomb Threat

NB Tel employees intercepted two telephone calls stating that there was a bomb at Point Lepreau. RCMP investigations resulted in two juveniles being charged under the Young Offenders Act with uttering a threat.

UER90-24: Load Shedding Logic on Loss of Class 4 Power

As a result of a reliability review of the standby class 3 power system, it was found that a portion of the control logic, which would ensure that the class 3 power system would only be required to supply necessary safety loads if class 4 power was lost, had not been fully implemented in accordance with the original design. However, the demonstrated capacity of the standby generators was sufficient to maintain class 3 power supplies with the as installed arrangement.

UER90-26: Control Computer Software Problems

Following modifications to the control computer software, a number of inappropriate alarms and indications were observed. AECB staff is discussing the issue of software quality assurance with NB Power under an Action Item.

UER90-27: Standby Generator Running Failure

While Standby Generator #2 was running in support of a maintenance outage on Standby Generator #1, a fuel return line fitting failed, causing a fuel spill. The machine was manually shut down for repair.

UER90-28: Plant Shutdown for Delayed Neutron Monitoring Tube Repair

Following the discovery of increasing levels of tritium in the reactor building, the unit was shut down to permit the repair of a leak in delayed neutron monitoring system tube. On the return to power, some difficulties were experienced with control of secondary side systems. AECB staff requested this report under the provisions of Operating Licence Condition A.A.12, since it appeared from plant data that the main steam safety valves should have operated, although there was no indication that they had in fact done so. Possible calibration problems with these valves are being discussed with NB Power.

ATTACHMENT C - COMPLIANCE INSPECTION AT POINT LEPREAU

A INTRODUCTION

The AECB Power Reactor Compliance Inspection Program is carried out by its site resident Project Officers, with specialist input from Ottawa based staff wherever appropriate. The program is currently under development, and consists of eight specific activities intended to assess the effectiveness of a licensee's operations and maintenance programs and procedures in ensuring that operation of the plant is carried out safely, to high quality standards, and in compliance with the terms of the facility Operating Licence and applicable legislation. These activities are summarised in the following table:

Area Inspections (Rounds)	A relatively frequent area by area inspection of the plant, checking for safety hazards, condition of equipment, housekeeping etc
System Inspections	A detailed inspection of each of the plant's individual systems, including its current status, maintenance and operating history, operating instructions, and events involving the system
Operating Practices Assessments	A detailed assessment carried out for an operator intensive plant condition, such as a reactor start up.
Quality Assurance Audit	An assessment of the effectiveness of one or more components of the licensee's quality assurance programs
Physical Security Assessment	An examination of security arrangements at the plant
Health Physics Appraisal	An assessment of one or more components of the licensee's health physics / radiation protection programs
Pressure Boundary Integrity Assessment	Monitoring to confirm that all repairs, maintenance or changes to safety significant systems containing fluids under pressure are carried out to applicable codes and standards
Emergency Preparedness Assessment	Monitoring to assess the effectiveness of licensee's readiness to respond to an emergency at the plant, including witnessing of drills and exercises

B COMPLIANCE INSPECTION AT POINT LEPREAU

AECB staff has completed inspections in five of the eight categories at Point Lepreau during 1990. For the three activities not undertaken in a formal manner - operating practices assessment, pressure boundary integrity assessment, and emergency preparedness assessment, AECB site Project Officers have continued to monitor NB Power's performance on a less formal basis. This approach will continue until resources are available to complete preparations for these program components. Assessments of Quality Assurance, health physics and physical security were completed with the co-operation of specialist staff based in Ottawa, and are described in the body of the report - see sections 3.8, 3.4 and 3.14 respectively. A routine program of area inspections is in place, which covers the areas shown in the table below. A number of system inspections was completed, but execution of a complete set of these inspections awaits the preparation of formal inspection material for some systems.

AREA	TARGET INSPECTION PERIOD
Control Room	1 Week
Control Equipment Room	1 Month
Secondary Control Area	1 Month
Turbine Building	1 Month
Reactor Building Accessible Areaa	1 month
Class I/II Power	1 Month
Class III/IV Power	1 Month
Service building	1 Month
Spent Fuel Bay	1 Month
Upgrader	1 Month
Fire Protection	1 Month
Exterior	3 months

The formal inspections summarised above form a complement to the normal daily monitoring of plant operations which is carried out by the site resident Project officers. This monitoring includes review of plant logs, examination of operating documentation and jumpers, and may include observation of the utility's daily work scheduling activities.